



North Carolina Department of Transportation
Transportation Program Management Unit - Value Management
Innovative Technologies and Products Awareness Report
November 8, 2018



PRODUCT HIGHLIGHT – Mobile Retroreflectometer



*DELTA's LTL-M Mobile
Retroreflectometer*

Glass beads can be incorporated into pavement marking material to ensure visibility during daytime, nighttime, and rainy weather conditions on roads and bridges. The beads provide the reflective properties in the material for increased visibility. Normally, an inspector would check the markings using a handheld reflectometer at different intervals to make sure the material meets the reflective requirements in our specifications. However, several Divisions have begun using a mobile retroreflectometer developed by Danish company DELTA. This sensor attaches beneath a vehicle as shown in the image to the left and uses a digital camera with real-time image processing to check reflectivity and line dimension readings at normal traffic speeds. The sensor has a 3-foot-wide viewing angle to capture line readings and can work during daytime or nighttime operations.

NCDOT started allowing contractors to use DELTA's mobile retroreflectometer on projects in 2008 and have continued to utilize the tool while tracking the performance. The Department's long-term evaluation of the product concluded that it provides comparable readings to handheld devices up to 70 mph. The inspector is inside the vehicle, driving with traffic while taking readings, which eliminates the need for a lane closure that is needed when using a handheld device. Additionally, this method allows for an increase in data collection and does not require any spot checking with a handheld reader. Handheld readings may still be used on small projects as the cost-benefit is found on larger scale projects. This technology was recently used on the Goldsboro Bypass at a cost of \$2,800 covering 97 miles of lines. Approximately \$800 and 56-man hours were saved by using a mobile retroreflectometer.



*LTL-M data readings displayed
on a tablet*

For more information, please visit: <https://roadsensors.madebydelta.com>

PRODUCT INNOVATION – Sequential Dynamic Curve Warning Systems

According to a two-year study developed by Iowa State University and sponsored by FHWA, horizontal curves in roadways account for 25 percent of roadway fatalities. The crash rate for curves is also three times higher than other roadway segments with the majority of these crashes being speed related. In an effort to reduce curve related crashes, companies such as Traffic and Parking Control Company (TAPCO) have developed Sequential Dynamic Curve Warning Systems (SDCWS). These systems are typically comprised of solar powered, LED lighted chevron arrow signs placed along the curve as shown in the image below. The chevron signs are connected to a control box that illuminates the signs in a sequential manner. This helps to caution drivers of an upcoming curve. The study took place at twelve high-crash locations in five states. Two years following the installation, the sites showed an 11 percent average decrease in vehicle speeds with the Sequential Dynamic Curve Warning Systems and three of the sites recorded a 100% reduction in the number of crashes.



Sequential Dynamic Curve Warning System Chevrons

NCDOT has installed this system at seven locations throughout the state. The first location was along US 23-441 in Macon and Jackson Counties and was installed in 2015. Each sign is estimated to cost about \$5,300 with \$100 per year in expected maintenance costs. Run-off-road crash data that the Department collects was used to determine the test-locations for installation. Safety evaluations on these projects will be performed after a full three years of data has been gathered. Pending the evaluation results, these systems will be incorporated at specific locations the Department identifies. This could include new projects that require a design exception on horizontal curves to enhance the safety of these locations. For more information, please visit: https://www.fhwa.dot.gov/hfl/partnerships/tapco/final_report.pdf